

Claims

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An exhaust pressure restriction device for an internal combustion engine comprising:

a turbocharger having a turbine, the turbine having an exhaust gas inlet connected to an exhaust manifold of the internal combustion engine, a turbine wheel drivingly engaging a compressor of the turbocharger, an exhaust gas outlet;

a waste gate valve in communication with the exhaust gas inlet;

a restrictor fitting having an exhaust gas inlet, an exhaust gas outlet and a restrictor orifice disposed between the exhaust gas inlet and the exhaust gas outlet, the restrictor fitting being mated to the turbine such that the exhaust inlet of the restrictor fitting is disposed for communication with the exhaust gas outlet of the turbine; and,

a bypass fitting having an exhaust gas inlet, an exhaust gas outlet, and a bypass passageway, the bypass fitting being coupled to both the restrictor fitting and the turbocharger such that the exhaust gas inlet of the bypass fitting is disposed for communication with the exhaust gas outlet of the restrictor fitting, and the bypass passageway is disposed for communication with the waste gate valve.

2. An exhaust pressure restriction device for an internal combustion engine as described in claim 1 wherein the restrictor fitting and turbine are provided with means for connecting the restrictor fitting to the turbocharger.

3. An exhaust pressure restriction device for an internal combustion engine as described in claim 1 wherein the exhaust outlet of the bypass fitting is fitted for communication with an exhaust discharge system of a vehicle.

4. An exhaust pressure restriction device for an internal combustion engine as described in claim 1 wherein the bypass fitting, restrictor fitting and turbine are provided with means for connecting the bypass fitting to the restrictor fitting and the turbocharger.
5. An exhaust pressure restriction device for an internal combustion engine as described in claim 1 wherein the restrictor fitting and bypass fitting are manufactured as a unitary part which is mounted to the turbine.
6. An exhaust pressure restriction device for an internal combustion engine as described in claim 1 wherein the restrictor fitting and bypass fitting are integrated into a housing of the turbine.
7. An exhaust pressure restriction device for an internal combustion engine as described in claim 1 wherein the exhaust gas outlet of the turbine is connected to the exhaust discharge system of the vehicle via the restrictor fitting and bypass fitting.
8. An exhaust pressure restriction device for an internal combustion engine as described in claim 1 wherein during a peak torque condition of the engine the waste gate valve is closed so that all exhaust gases are routed to the turbine wheel thus driving the compressor, the gases then exit the turbine at the exhaust gas outlet through the restrictor orifice of the restrictor fitting and out the exhaust gas outlet of the bypass fitting.
9. An exhaust pressure restriction device for an internal combustion engine as described in claim 8 wherein the size of the restrictor orifice of the restrictor fitting is selected to create enough back pressure at the peak torque condition to attain a desired level of negative delta P necessary to drive exhaust gas recirculation (EGR), wherein delta P is defined as the difference in pressure between the exhaust manifold of the engine and an intake manifold of the engine and a negative delta P represents a higher pressure in the exhaust manifold than in the intake manifold.

10. An exhaust pressure restriction device for an internal combustion engine as described in claim 9 wherein as the speed of the engine increases the waste gate valve opens allowing a portion of the exhaust gases to bypass the turbine wheel and the restrictor orifice via the bypass passageway thereby lowering the back pressure, whereby the negative delta P at rated speed full load is reduced so as to improve fuel economy at the rated speed full load operating point while still maintaining a level adequate to drive EGR.

11. An exhaust pressure restriction device for an internal combustion engine as described in claim 1 wherein the waste gate valve is selectively opened and closed based upon an operating condition of the engine and when closed all exhaust gases are routed to the turbine wheel thus driving the compressor, the gases then exit the turbine at the exhaust gas outlet through the restrictor orifice of the restrictor fitting and out the exhaust gas outlet of the bypass fitting.

12. An exhaust pressure restriction device for an internal combustion engine as described in claim 11 wherein the size of the restrictor orifice of the restrictor fitting is selected to create enough back pressure at a specific operating condition to attain the desired level of negative delta P necessary to drive exhaust gas recirculation (EGR), wherein delta P is defined as the difference in pressure between the exhaust manifold of the engine and an intake manifold of the engine and a negative delta P represents a higher pressure in the exhaust manifold than in the intake manifold.

13. An exhaust pressure restriction device for an internal combustion engine as described in claim 12 wherein when the waste gate valve is opened a portion of the exhaust gases are allowed to bypass the turbine wheel and the restrictor orifice via the bypass passageway thereby lowering the back pressure, whereby the negative delta P is reduced.

14. An exhaust pressure restriction device for an internal combustion engine as

described in claim 1 wherein the waste gate is integrated into the turbine housing.

15. An exhaust pressure restriction device for an internal combustion engine as described in claim 1 wherein the waste gate is integrated into the exhaust manifold.